CLAIMS:

1. A method of environmental adaptation of a speech recognition system (402) providing a sequence of feature vectors, each feature vector being descriptive of a power spectrum of speech (400) to be recognized, for each feature vector component, the method comprising the steps of:

- calculating a silence probability of the feature vector component by means of a monotonous decreasing probability function,
- providing mean values for silence and speech intervals of respective components of at least a sub-set of training feature vectors,
- calculating a mean value for silence and speech intervals for the feature vector component by means of a mean function based on at least a subset of respective feature vectors,
- transforming the feature vector component by means of a transformation function, the transformation function being based on the mean value for silence and speech of the feature vectors and the training feature vectors, the silence probability of the feature vector component and on the feature vector component itself.

2. The method according to claim 1, the method further for each feature vector component comprising the steps of:

- calculating a speech probability for speech by means of a monotonous increasing probability function,
- transforming the feature vector component by means of the transformation function, the transformation function being further based on the probability for speech of the feature vector component.

3. The method according to claim 1 or 2, wherein the mean function is a

moving weighted average function, the calculation of the mean value for silence and speech intervals being based on the subset of feature vectors, the subset comprising at least a number of 10, preferably a number of 20 to 30 feature vectors.

4. The method according to any one of the claims 1 to 3, wherein providing of mean values for silence and speech intervals of the training feature vectors is based on a training mean function, which is a weighted average function for a subset of training feature vectors, the subset at least a number of 10, preferably a number of 20 to 30 feature vectors.

5. The method according to any one of the claims 1 to 4, wherein the probability function comprises a slope constant (α being descriptive of the slope of the monotonous probability function, the slope constant being modifiable.

6. The method according to any one of the claims 1 to 5, wherein the transformation of the feature vector component is given by:

$$F_{c,new} = F_{c,old} + (MTR_{Sil} - M_{Sil})P_{Sil} + (MTR_{Sp} - M_{Sp})P_{Sp},$$

where:

$F_{c,new}$: transformed feature vector component,

$F_{c,old}$: feature vector component,

MTR_{Sil} : mean value for silence of training feature vectors,

MTR_{Sp} : mean value for speech of training feature vectors,

M_{Sp} : mean value for speech of feature vectors,

M_{Sil} : mean value for silence of feature vectors,

P_{Sil} : silence probability,

P_{Sp} : speech probability.

7. The method according to any one of the claims 1 to 6, wherein the silence

probability function is given by a Sigmoid function of the form:

$$P_{Sil} = 1 - \frac{1}{1 + \exp((M_{Sil} + V_{Sil} - F_c)\alpha / V_{Sil})},$$

and the speech probability function being given by:

$$P_{sp} = 1 - P_{Sil},$$

where:

M_{Sil}: mean value for silence interval of the speech,

V_{Sil}: variance from the mean value for silence,

α: slope constant,

F_c: feature vector component.

8. A system for speech recognition (402) with environmental adaptation, providing a sequence of feature vectors, each feature vector being descriptive of a power spectrum of speech (400) to be recognized, for each feature vector component, the system comprising:

- means for calculating a silence probability (418) of the feature vector component by means of a monotonous decreasing probability function,
- means for providing mean values (416) for silence and speech intervals of respective components of at least a sub-set of training feature vectors,
- means for calculating a mean value for silence and speech intervals (420) for the feature vector component by means of a mean function based on at least a subset of respective feature vectors,
- means for transforming the feature vector component (422) by means of a transformation function, the transformation function being based on the mean value for silence and speech of the feature vectors and the training feature vectors, the silence probability of the feature vector component and on the feature vector component itself.

9. The system according to claim 8, the system for each feature vector component comprising:

- means for calculating a speech probability for speech (418) by means of a monotonous increasing probability function,
- means for transforming the feature vector component (422) by means of the transformation function, the transformation function being further based on the probability for speech of the feature vector component.

10. The system according to claim 8 or 9, wherein the mean function is a moving weighted average function, the calculation of the mean value for silence and speech intervals being based on the subset of feature vectors, the subset comprising at least a number of 10, preferably a number of 20 to 30 feature vectors.

11. The speech recognition system according to any one of the claims 8 to 10, wherein means to provide mean values for silence and speech of training feature vector components (416) comprise storage means in which the mean values for silence and speech of training feature vector components are stored.

12. A computer program product with computer program means for a system for speech recognition (402) with environmental adaptation providing a sequence of feature vectors, each feature vector being descriptive of a power spectrum of speech to be recognized, for each feature vector component the computer program product comprising program means for:

- calculating a silence probability of the feature vector component by means of a monotonous decreasing probability function,
- providing mean values for silence and speech intervals of respective components of at least a sub-set of training feature vectors,
- calculating a mean value for silence and speech intervals for the feature vector component by means of a mean function based on at least a subset of respective feature vectors,
- transforming the feature vector component by means of a transformation function, the transformation function being based on the mean value for

silence and speech of the feature vectors and the training feature vectors, the silence probability of the feature vector component and on the feature vector component itself.

13. The computer program product according to claim 12, for each feature vector component the computer program product comprising program means for:

- calculating a speech probability for speech by means of a monotonous increasing probability function,
- transforming the feature vector component by means of the transformation function, the transformation function being further based on the probability for speech of the feature vector component.

14. The computer program product according to claim 12 or 13, wherein the mean function is a moving weighted average function, the calculation of the mean value for silence and speech intervals being based on the subset of feature vectors, the subset comprising at least a number of 10, preferably a number of 20 to 30 feature vectors.

15. The computer program product according to any one of the claims 12 to 14 wherein the transformation of the feature vector component is given by:

$$F_{c,new} = F_{c,old} + (MTR_{Sil} - M_{Sil})P_{Sil} + (MTR_{Sp} - M_{Sp})P_{Sp},$$

where:

$F_{c,new}$: transformed feature vector component,

$F_{c,old}$: feature vector component,

MTR_{Sil} : mean value for silence of training feature vectors,

MTR_{Sp} : mean value for speech of training feature vectors,

M_{Sp} : mean value for speech of feature vectors,

M_{Sil} : mean value for silence of feature vectors,

P_{Sil} : silence probability,

P_{Sp} : speech probability.

16. The computer program product according to any one of the claims 12to 15 wherein the silence probability function is given by a Sigmoid function of the form:

$$P_{Sil} = 1 - \frac{1}{1 + \exp((M_{Sil} + V_{Sil} - F_c)\alpha / V_{Sil})},$$

and the speech probability function being given by:

$P_{sp} = 1 - P_{Sil}$,

where:

M_{Sil} : mean value for silence interval of the speech,

V_{Sil} : variance from the mean value for silence,

α : slope constant,

F_c : feature vector component.